Pb Heavy Metal Pollution in Plants in Ex-Coal Mining AreasKutai Kertanegara East Kalimantan Indonesia

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Abstract:- The purpose of this study was to analyze the content of heavy metal (Pb) in banana, papaya and cassava leaves in the former coal mining area. The metal content analyzed will be compared with the quality standard of plant heavy metal content according to SNI 7387: 2009. The research was conducted in July 2013. The locations studied were 3 ex-coal mining locations (3 ex-mining areas that have been planted with papaya, banana and cassava) . The number of plant samples was 3 samples (banana, papaya leaf and cassava). Heavy metal levels were analyzed using Atomic Absorption Spectrophotometer (AAS). The results of research on bananas and papayas show that there is heavy metal contamination of Pb because it exceeds 0.5 mg / Kg of quality standards for safe limits, so it is dangerous for human consumption, except for undetected cassava leaves.

Keywords:- Heavy Metals, Plants, Former Coal Mining Land.

I. INTRODUCTION

Coal is a mining material that has high economic value. Indonesia is one of the second largest coal producing countries after Australia until 2008. The total coal resources owned by Indonesia reached 104,940 billion tons with total reserves of 21.13 billion tons. This has both negative and positive effects. The positive thing is the increase in foreign exchange from mining activities, the negative impact is environmental damage and health problems due to the mining process. Environmental damage due to mining activities will also leave ex-mining land with damaged soil physical conditions, low soil fertility, high soil acidity, high heavy metal content, and low soil organic matter. One of the pollutants that are very dangerous to human health is the heavy metals from the WHO (World Health Organization) and the FAO (Food Agriculture Organization) washing seafood which is contaminated with heavy metals. Heavy metals usually have a special effect on living things. It can be said that all heavy metals can be toxic to living bodies exceed the allowable threshold. However, some of these heavy metals are needed by the body of living things in certain (small) amounts, which if not fulfilled will have fatal consequences for the survival of these living things (Kusnoto and Kusumodirjo, 1995).

According to Darmono (1995), the factors that cause heavy metals to enter the pollutant group are heavy metals which are not biodegradable and easily absorbed. The first organisms that are affected by the addition of heavy metal pollutants to the soil or other habitats are organisms and plants that grow in the soil or habitat. In natural ecosystems, there are interactions between organisms, both positive and negative, which describe the form of energy transfer between populations in the community. Thus the influence of these heavy metals will eventually reach the highest food chain hierarchy, namely humans.

Based on the above background, the importance of research and analysis of heavy metal content in soil and plants in coal mining areas is to prevent environmental pollution due to heavy metals and their negative impact on living things.This is to analyze the content of heavy metals in the soil and plants in former coal mines. The metal content analyzed will be compared with the metal content quality standard to determine the level of pollution.

II. RESEARCH METHODS

A. Research Stages
The research stages of the analysis of plant heavy metal pollution in the Ex Coal Mining Area are:
1. Field Survey to determine land in the former coal mining environment to be analyzed for heavy metals (samples composite) 3 plants (papaya, banana and cassava).
2. Taking 3 composite samples per plant plot (papaya, banana and cassava) in 3 ex-mining areas (3 planted areas) in the observed ex-coal mining area.
3. Plant samples are analyzed for their heavy metal content in the laboratory using a spectrophotometer, then the results of the analysis are compared with environmental quality standards for heavy metal levels in SNI 7387: 2009 to determine the level of pollution.

B. Place of Research
The research location was conducted on the land of a former coal mining company, Embalut Village, Kutai Kertanegara indonesia.

C. Research Result

Analysis of soil and plant heavy metals using the Technical Method of Chemical Analysis of Plant Soil, Water and Fertilizer, BPT Deptan 2005, measured using AASResults of analysis of heavy metals in plants.The following is the analysis data for heavy metals Pb in cassava, banana and papaya plants in the former coal mining area of Embalut Village, Kutai Kertanegara.

Analysis of Heavy MetalsPb in Plants in Ex-Coal Mining Areas
1. Cassava leaf + stalk Not detected
2. Bananas fruit 67.0 mg/Kg
3. Papaya fruit 53.0 mg/Kg

The analysis of plant samples was carried out at the Laboratory of PT Mutuagung Bogor by using AAS to determine the content of heavy metals and using the technical technical analysis method for Water Plant Soil Chemical Analysis and Fertilizer BPT Deptan, 2005. There are 3 types of plant samples 1). Samples of cassava leaves and stalks 2). Banana samples, 3) Papaya samples. Metals observed were lead (Pb), The heavy metal content in plants detected were Pb metal, undetectable Pb metal for leaf and cassava stalk samples (Ttd), Pb metal for banana fruit samples = 67.0 mg / Kg, Pb metal for papaya fruit samples = 53.0 mg / Kg.The following are standard heavy metal products that are safe / maximum in food. (SNI 7387: 2009)Quality standards for safe limits (heavy metal in Food)Maximum Limit Food MetalsPb Fruits and vegetables 0.5 mg / Kg. Based on the comparison for of quality standards for safe limits,and the analysis of papaya and banana fruit above, the Pb metal content is above the of quality standards for safe limits, or it's at a dangerous level for human consumption and critical for the content in plants. metal Pb in leaves and stems was not detected.Based of quality standards for safe limits,and the analysis of papaya and banana fruit above, the Pb metal content in bananas and papayas whose content is above of quality standards for safe limits,or its at a dangerous level for human consumption and critical for plant content. For Pb metal on leaves and stems was not detected.

III. CONCLUSIONS AND RECOMMENDATIONS

A. CONCLUSION

Based on the results of laboratory analysis of heavy metal Pb in plant composite samples (cassava leaves, banana and papaya), it is known that the metal that pollutes the environment is Pb metal because the amount of its content is above bakumutu or exceeds the maximum limit.

B. RECOMMENDATIONS

Detoxification (removing hazardous substances) is recommended for ex-coal mining areas before planting, especially for fruit trees because they are dangerous for human consumption. To Overcoming heavy metals in ex-coal mining areas requires routine chemical analysis and a remediation process is needed to bind dangerous heavy metals. Comprehensive land management planning is required before using coal mining land as agricultural land.

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